DIPLOMADO DE PROFUNDIZACION CISCO (DISEÑO E IMPLEMENTACION DE SOLUCIONES INTEGRADAS LAN/WAN)

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PROGRAMA DE INGENIERIA ELECTRONICA
ESCUELA DE CIENCIAS BASICAS, TECNOLOGIAS E INGENIERIA

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1. INTRODUCCION

Mediante este trabajo practico, se pretende hacer una configuración para interconectar una empresa que tiene sedes en distintas ciudades, a través de Packet Tracer y usando todo lo aprendido durante el diplomado de Cisco se hará dicha configuración que nos permite poner en práctica todos los conceptos aprendidos en este curso.

La introducción de un servidor de protocolo de configuración dinámica de host (DHCP) en la red local simplifica la asignación de direcciones IP tanto a los dispositivos de escritorio como a los móviles. El uso de un servidor de DHCP centralizado permite a las organizaciones administrar todas las asignaciones de direcciones IP desde un único servidor. Esta práctica hace que la administración de direcciones IP sea más eficaz y asegura la coherencia en toda la organización, incluso en las sucursales.

El rendimiento de la red es un factor importante en la productividad de una organización. Una de las tecnologías que contribuyen a mejorar el rendimiento de la red es la división de los grandes dominios de difusión en dominios más pequeños. Por una cuestión de diseño, los routers bloquean el tráfico de difusión en una interfaz. Sin embargo, los routers generalmente tienen una cantidad limitada de interfaces LAN. La función principal de un router es trasladar información entre las redes, no proporcionar acceso a la red a las terminales.

La función de proporcionar acceso a una LAN suele reservarse para los switches de capa de acceso. Se puede crear una red de área local virtual (VLAN) en un switch de capa 2 para reducir el tamaño de los dominios de difusión, similares a los dispositivos de capa 3. Por lo general, las VLAN se incorporan al diseño de red para facilitar que una red dé soporte a los objetivos de una organización. Si bien las VLAN se utilizan principalmente dentro de las redes de área local conmutadas, las implementaciones modernas de las VLAN les permiten abarcar redes MAN y WAN.

2. OBJETIVOS

2.1 Objetivo General

Diseñar una red capaz de administrar la información de una empresa que tiene sede en diferentes ciudades, utilizando packet Tracer.

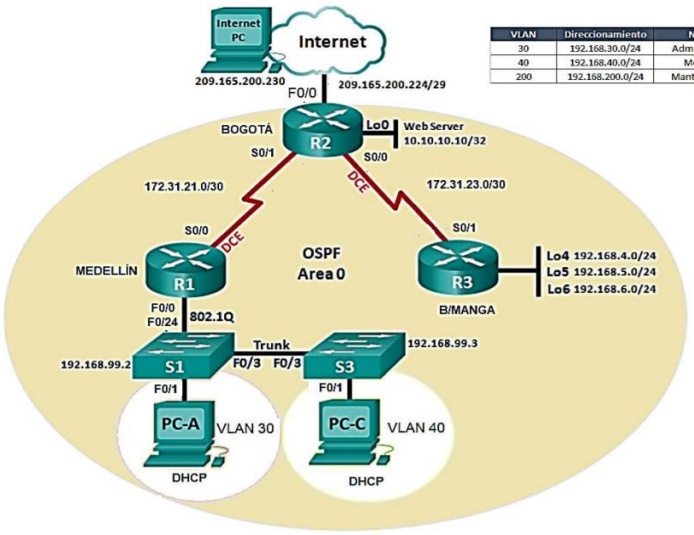
2.2 objetivos específicos

- configurar la red para interconectar las ciudades.
- Diseñar el protocolo de enrutamiento, para dicha red.
- Establecer los dispositivos necesarios para el funcionamiento de la red.
- Realizar configuración de dispositivos.
- Realizar pruebas para verificar su funcionamiento.

3. DESARROLLO DE ACTIVIDAD

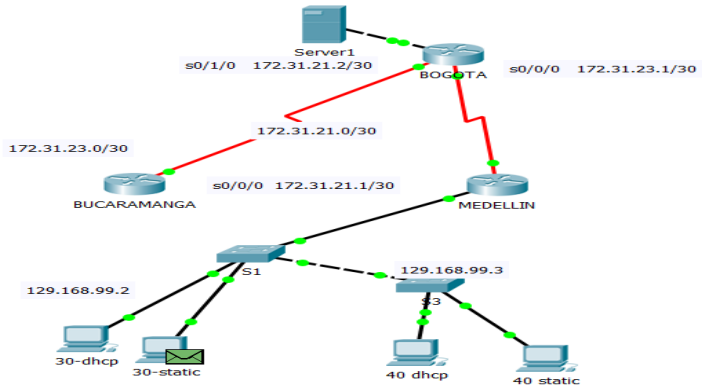
Escenario: Una empresa de Tecnología posee tres sucursales distribuidas en las ciudades de Bogotá, Medellín y Bucaramanga, en donde el estudiante será el administrador de la red, el cual deberá configurar e interconectar entre sí cada uno de los dispositivos que forman parte del escenario, acorde con los lineamientos establecidos para el direccionamiento IP, protocolos de enrutamiento y demás aspectos que forman parte de la topología de red.

Topología de red



VLAN	Direccionamiento	Nombre
30	192.168.30.0/24	Administración
40	192.168.40.0/24	Mercadeo
200	192.168.200.0/24	Mantenimiento

1. **Configurar el direccionamiento IP acorde con la topología de red para cada uno de los dispositivos que forman parte del escenario**



2. Configurar el protocolo de enrutamiento OSPFv2 bajo los siguientes criterios:

OSPFv2 area 0

Configuration Item or Task	Specification
Router ID R1	1.1.1.1
Router ID R2	2.2.2.2
Router ID R3	3.3.3.3
Configurar todas las interfaces LAN como pasivas	
Establecer el ancho de banda para enlaces seriales en	128 Kb/s
Ajustar el costo en la métrica de S0/0 a	7500

Verificar información de OSPF

- **Visualizar tablas de enrutamiento y routers conectados por OSPFv2**

VISUALIZAR TABLAS DE ENRUTAMIENTO Y ROUTERS CONECTADOS POR OSPFV2			
	MEDELLIN	**BOGOTA**	**BUCARAMANGA**
TABLAS DE ENRUTAMIENTO	MEDELLIN#sh ip route Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2 E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area * - candidate default, U - per-user static route, o - ODR P - periodic downloaded static route Gateway of last resort is not set 172.31.0.0/30 is subnetted, 2 subnets C 172.31.21.0 is directly connected, Serial0/0/0 O 172.31.23.0 [110/15000] via 172.31.21.2, 00:00:25, Serial0/0/0 C 192.168.30.0/24 is directly connected, FastEthernet0/0.30 C 192.168.40.0/24 is directly connected, FastEthernet0/0.40 C 192.168.99.0/24 is directly connected, FastEthernet0/0.99 C 192.168.200.0/24 is directly connected, FastEthernet0/0.200 209.165.200.0/29 is subnetted, 1 subnets O 209.165.200.224 [110/7501] via 172.31.21.2, 00:00:25, Serial0/0/0	BOGOTA#sh ip route Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2 E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area * - candidate default, U - per-user static route, o - ODR P - periodic downloaded static route Gateway of last resort is not set 10.0.0.0/32 is subnetted, 1 subnets C 10.10.10.10 is directly connected, Loopback0 172.31.0.0/30 is subnetted, 2 subnets C 172.31.21.0 is directly connected, Serial0/1/0 C 172.31.23.0 is directly connected, Serial0/0/0 O 192.168.30.0/24 [110/65] via 172.31.21.1, 00:00:10, Serial0/1/0 O 192.168.40.0/24 [110/65] via 172.31.21.1, 00:00:10, Serial0/1/0 209.165.200.0/29 is subnetted, 1 subnets C 209.165.200.224 is directly connected, FastEthernet0/0 BOGOTA#	BUCARAMANGA#sh ip route Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2 E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area * - candidate default, U - per-user static route, o - ODR P - periodic downloaded static route Gateway of last resort is not set 172.31.0.0/30 is subnetted, 2 subnets O 172.31.21.0 [110/128] via 172.31.23.1, 00:01:23, Serial0/1/0 C 172.31.23.0 is directly connected, Serial0/1/0 C 192.168.4.0/24 is directly connected, Loopback4 C 192.168.5.0/24 is directly connected, Loopback5 C 192.168.6.0/24 is directly connected, Loopback6 O 192.168.30.0/24 [110/129] via 172.31.23.1, 00:01:23, Serial0/1/0 O 192.168.40.0/24 [110/129] via 172.31.23.1, 00:01:23, Serial0/1/0 209.165.200.0/29 is subnetted, 1 subnets O 209.165.200.224 [110/65] via 172.31.23.1, 00:01:23, Serial0/1/0 BUCARAMANGA#
ROUTER CONECTADOS	MEDELLIN#sh ip ospf neighbor Neighbor ID Pri State Dead Time Address Interface 2.2.2.2 0 FULL/ - 00:00:35 172.31.21.2 Serial0/0/0 MEDELLIN#	BOGOTA#sh ip ospf neighbor Neighbor ID Pri State Dead Time Address Interface 3.3.3.3 0 FULL/ - 00:00:32 172.31.23.2 Serial0/0/0 1.1.1.1 0 FULL/ - 00:00:37 172.31.21.1 Serial0/1/0	BUCARAMANGA#sh ip ospf neighbor Neighbor ID Pri State Dead Time Address Interface 2.2.2.2 0 FULL/ - 00:00:36 172.31.23.1 Serial0/1/0 BUCARAMANGA#

- **Visualizar lista resumida de interfaces por OSPF en donde se ilustre el costo de cada interface**

<table>
<tr><td colspan="4">• Visualizar lista resumida de interfaces por OSPF en donde se ilustre el costo de cada interface</td></tr>
<tr><td>costo de cada interface</td><td>BUCARAMANGA#sh ip ospf interface
Serial0/1/0 is up, line protocol is up
Internet address is 172.31.23.2/30, Area 0
Process ID 1, Router ID 3.3.3.3, Network Type POINT-TO-POINT, Cost: 64
Transmit Delay is 1 sec, State POINT-TO-POINT, Priority 0
No designated router on this network
No backup designated router on this network
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
Hello due in 00:00:09
Index 1/1, flood queue length 0
Next 0x0(0)/0x0(0)
Last flood scan length is 1, maximum is 1
Last flood scan time is 0 msec, maximum is 0 msec
Neighbor Count is 1 , Adjacent neighbor count is 1
Adjacent with neighbor 2.2.2.2
Suppress hello for 0 neighbor(s)</td><td>BOGOTA#sh ip ospf interface
FastEthernet0/0 is up, line protocol is up
Internet address is 209.165.200.225/29, Area 0
Process ID 1, Router ID 2.2.2.2, Network Type BROADCAST, Cost: 1
Transmit Delay is 1 sec, State DR, Priority 1
Designated Router (ID) 2.2.2.2, Interface address 209.165.200.225
No backup designated router on this network
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit5
Hello due in 00:00:02
Index 1/1, flood queue length 0
Next 0x0(0)/0x0(0)
Last flood scan length is 1, maximum is 1
Last flood scan time is 0 msec, maximum is 0 msec
Neighbor Count is 0, Adjacent neighbor count is 0
Suppress hello for 0 neighbor(s)
Serial0/0/0 is up, line protocol is up
Internet address is 172.31.23.1/30, Area 0
Process ID 1, Router ID 2.2.2.2, Network Type POINT-TO-POINT, Cost: 7500
Transmit Delay is 1 sec, State POINT-TO-POINT, Priority 0
No designated router on this network
No backup designated router on this network
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit5
Hello due in 00:00:02
Index 2/2, flood queue length 0
Next 0x0(0)/0x0(0)
Last flood scan length is 1, maximum is 1
Last flood scan time is 0 msec, maximum is 0 msec
Neighbor Count is 1 , Adjacent neighbor count is 1
Adjacent with neighbor 3.3.3.3
Suppress hello for 0 neighbor(s)
Serial0/1/0 is up, line protocol is up
Internet address is 172.31.21.2/30, Area 0
Process ID 1, Router ID 2.2.2.2, Network Type POINT-TO-POINT, Cost: 64
Transmit Delay is 1 sec, State POINT-TO-POINT, Priority 0
No designated router on this network
No backup designated router on this network
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit5
Hello due in 00:00:08
Index 3/3, flood queue length 0
Next 0x0(0)/0x0(0)
Last flood scan length is 1, maximum is 1
Last flood scan time is 0 msec, maximum is 0 msec
Neighbor Count is 1 , Adjacent neighbor count is 1
Adjacent with neighbor 1.1.1.1
Suppress hello for 0 neighbor(s)
BOGOTA#</td><td>BUCARAMANGA#sh ip ospf interface
Serial0/1/0 is up, line protocol is up
Internet address is 172.31.23.2/30, Area 0
Process ID 1, Router ID 3.3.3.3, Network Type POINT-TO-POINT, Cost: 64
Transmit Delay is 1 sec, State POINT-TO-POINT, Priority 0
No designated router on this network
No backup designated router on this network
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
Hello due in 00:00:03
Index 1/1, flood queue length 0
Next 0x0(0)/0x0(0)
Last flood scan length is 1, maximum is 1
Last flood scan time is 0 msec, maximum is 0 msec
Neighbor Count is 1 , Adjacent neighbor count is 1
Adjacent with neighbor 2.2.2.2
Suppress hello for 0 neighbor(s)</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

- **Visualizar el OSPF Process ID, Router ID, Address summarizations, Routing Networks, and passive interfaces configuradas en cada router.**

Visualizar el OSPF Process ID, Router ID, Address summarizations, Routing Networks, and passive interfaces configuradas en cada router

OSPFv2 es la versión del protocolo OSPF que actualmente utilizamos en redes IPv4.
En este caso, el formato del router ID coincide con el formato de las direcciones IP utilizadas en las interfaces por lo que es posible utilizar la dirección IP de una interfaz como router ID, de manera tal que no es obligatorio configurar un router-id y el sistema operativo puede tomar la dirección IP de una interfaz para ser utilizada en esta función.
Por este motivo, al momento de levantar el proceso de OSPF la definición del router ID sigue esta secuencia:
Si hay router-id configurado, se utiliza ese router ID.
Si no hay router-id configurado se utiliza la dirección IP más alta de las interfaces de loopback configuradas.
Si no hay interfaces de loopback configuradas, se toma la IP más alta de las interfaces fisicas que se encuentren operativas (up) al momento de levantar el proceso.
Si no hay interfaces fisicas operativas, el proceso de OSPF no se inicia.

OSPF Process ID, Router ID

```
MEDELLIN#sh ip ospf database
        OSPF Router with ID (1.1.1.1) (Process ID 1)

            Router Link States (Area 0)

Link ID     ADV Router      Age         Seq#       Checksum Link count
1.1.1.1     1.1.1.1         1543        0x80000005 0x008ada 4
2.2.2.2     2.2.2.2         1543        0x80000006 0x00d828 5
3.3.3.3     3.3.3.3         1543        0x80000002 0x00a23e 2
```

```
BOGOTA#sh ip ospf database
        OSPF Router with ID (2.2.2.2) (Process ID 1)

            Router Link States (Area 0)

Link ID     ADV Router      Age         Seq#       Checksum Link count
3.3.3.3     3.3.3.3         1484        0x80000002 0x00a23e 2
1.1.1.1     1.1.1.1         1484        0x80000005 0x008ada 4
  2.2.2.2       2.2.2.2         1484        0x80000006 0x00d828 5
```

```
BUCARAMANGA(config)#do sh ip ospf data
        OSPF Router with ID (3.3.3.3) (Process ID 1)

            Router Link States (Area 0)

Link ID     ADV Router      Age         Seq#       Checksum Link count
3.3.3.3     3.3.3.3         1581        0x80000002 0x00a23e 2
1.1.1.1     1.1.1.1         1581        0x80000005 0x008ada 4
2.2.2.2     2.2.2.2         1581        0x80000006 0x00d828 5
```

Address summarizations, Routing Networks

```
MEDELLIN#sh ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     172.31.0.0/30 is subnetted, 2 subnets
C       172.31.21.0 is directly connected, Serial0/0/0
O       172.31.23.0 [110/15000] via 172.31.21.2, 00:29:23, Serial0/0/0
C    192.168.30.0/24 is directly connected, FastEthernet0/0.30
C    192.168.40.0/24 is directly connected, FastEthernet0/0.40
C    192.168.99.0/24 is directly connected, FastEthernet0/0.99
C    192.168.200.0/24 is directly connected, FastEthernet0/0.200
     209.165.200.0/29 is subnetted, 1 subnets
O       209.165.200.224 [110/7501] via 172.31.21.2, 00:29:23, Serial0/0/0

MEDELLIN#sh ip route ospf
     172.31.0.0/30 is subnetted, 2 subnets
O       172.31.23.0 [110/15000] via 172.31.21.2, 00:29:52, Serial0/0/0
     209.165.200.0/29 is subnetted, 1 subnets
O       209.165.200.224 [110/7501] via 172.31.21.2, 00:29:52, Serial0/0/0
MEDELLIN#
```

```
BOGOTA#sh ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     10.0.0.0/32 is subnetted, 1 subnets
C       10.10.10.10 is directly connected, Loopback0
     172.31.0.0/30 is subnetted, 2 subnets
C       172.31.21.0 is directly connected, Serial0/1/0
C       172.31.23.0 is directly connected, Serial0/0/0
O    192.168.30.0/24 [110/65] via 172.31.21.1, 00:30:23, Serial0/1/0
O    192.168.40.0/24 [110/65] via 172.31.21.1, 00:30:23, Serial0/1/0
     209.165.200.0/29 is subnetted, 1 subnets
C       209.165.200.224 is directly connected, FastEthernet0/0

BOGOTA#sh ip route ospf
O    192.168.30.0 [110/65] via 172.31.21.1, 00:30:18, Serial0/1/0
O    192.168.40.0 [110/65] via 172.31.21.1, 00:30:18, Serial0/1/0
```

```
BUCARAMANGA#sh ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     172.31.0.0/30 is subnetted, 2 subnets
O       172.31.21.0 [110/128] via 172.31.23.1, 00:30:55, Serial0/1/0
C       172.31.23.0 is directly connected, Serial0/1/0
C    192.168.4.0/24 is directly connected, Loopback4
C    192.168.5.0/24 is directly connected, Loopback5
C    192.168.6.0/24 is directly connected, Loopback6
O    192.168.30.0/24 [110/129] via 172.31.23.1, 00:30:55, Serial0/1/0
O    192.168.40.0/24 [110/129] via 172.31.23.1, 00:30:55, Serial0/1/0
     209.165.200.0/29 is subnetted, 1 subnets
O       209.165.200.224 [110/65] via 172.31.23.1, 00:30:55, Serial0/1/0

BUCARAMANGA#sh ip route ospf
     172.31.0.0/30 is subnetted, 2 subnets
O       172.31.21.0 [110/128] via 172.31.23.1, 00:31:07, Serial0/1/0
O    192.168.30.0 [110/129] via 172.31.23.1, 00:31:07, Serial0/1/0
O    192.168.40.0 [110/129] via 172.31.23.1, 00:31:07, Serial0/1/0
     209.165.200.0/29 is subnetted, 1 subnets
O       209.165.200.224 [110/65] via 172.31.23.1, 00:31:07, Serial0/1/0
```

passive interfaces configuradas

```
router ospf 1
router-id 1.1.1.1
log-adjacency-changes
passive-interface FastEthernet0/0
network 172.31.21.0 0.0.0.3 area 0
network 192.168.30.0 0.0.0.255 area 0
network 192.168.40.0 0.0.0.255 area 0

MEDELLIN#sh ip route ospf
     172.31.0.0/30 is subnetted, 2 subnets
O       172.31.23.0 [110/15000] via 172.31.21.2, 00:35:47, Serial0/0/0
     209.165.200.0/29 is subnetted, 1 subnets
O       209.165.200.224 [110/7501] via 172.31.21.2, 00:35:47, Serial0/0/0
```

```
!
router ospf 1
router-id 2.2.2.2
log-adjacency-changes
network 172.31.21.0 0.0.0.3 area 0
network 172.31.23.0 0.0.0.3 area 0
network 209.165.200.224 0.0.0.7 area 0
!
BOGOTA#sh ip route ospf
O    192.168.30.0 [110/65] via 172.31.21.1, 00:03:09, Serial0/1/0
O    192.168.40.0 [110/65] via 172.31.21.1, 00:03:09, Serial0/1/0
```

```
!
router ospf 1
router-id 3.3.3.3
log-adjacency-changes
network 172.31.23.0 0.0.0.3 area 0

BUCARAMANGA#sh ip route ospf
     172.31.0.0/30 is subnetted, 2 subnets
O       172.31.21.0 [110/128] via 172.31.23.1, 00:04:03, Serial0/1/0
O    192.168.30.0 [110/129] via 172.31.23.1, 00:03:53, Serial0/1/0
O    192.168.40.0 [110/129] via 172.31.23.1, 00:03:53, Serial0/1/0
     209.165.200.0/29 is subnetted, 1 subnets
O       209.165.200.224 [110/65] via 172.31.23.1, 00:04:03, Serial0/1/0
```

3. **Configurar VLANs, Puertos troncales, puertos de acceso, encapsulamiento, Inter-VLAN Routing y Seguridad en los Switches acorde a la topología de red establecida.**

Configurar VLANs, Puertos troncales, puertos de acceso, encapsulamiento, Inter-VLAN Routing y Seguridad en los Switches acorde a la topología de red establecida. Se configurar como subinterfaces a nivel de capa			
VLANs	MEDELLIN#sh ip interface brief Interface IP-Address OK? Method Status Protocol FastEthernet0/0 unassigned YES unset up up FastEthernet0/0.30 192.168.30.1 YES manual up up FastEthernet0/0.40 192.168.40.1 YES manual up up FastEthernet0/0.99 192.168.99.1 YES manual up up FastEthernet0/0.200 192.168.200.1 YES manual up up FastEthernet0/1 unassigned YES unset administratively down down Serial0/0/0 172.31.21.1 YES manual up up Serial0/1/0 unassigned YES unset administratively down down Vlan1 unassigned YES unset administratively down down S1#sh vlan brief VLAN Name Status Ports ---- ---------- --------- ------------------------------- 1 default active Fa0/4, Fa0/5, Fa0/6, Fa0/7 Fa0/8, Fa0/9, Fa0/10, Fa0/11 Fa0/12, Fa0/13, Fa0/14, Fa0/15 Fa0/16, Fa0/17, Fa0/18, Fa0/19 Fa0/20, Fa0/21, Fa0/22, Fa0/23 30 ADMINISTRACION active Fa0/1, Fa0/2 40 MERCADEO active 99 GESTION active 200 MANTENIMIENTO active 1002 fddi-default active 1003 token-ring-default active 1004 fddinet-default active 1005 trnet-default active S1# S3#sh vlan brief VLAN Name Status Ports ---- ---------- --------- ------------------------------- 1 default active Fa0/4, Fa0/5, Fa0/6, Fa0/7 Fa0/8, Fa0/9, Fa0/10, Fa0/11 Fa0/12, Fa0/13, Fa0/14, Fa0/15 Fa0/16, Fa0/17, Fa0/18, Fa0/19 Fa0/20, Fa0/21, Fa0/22, Fa0/23 Fa0/24 40 MERCADEO active Fa0/1, Fa0/2 99 GESTION active 1002 fddi-default active 1003 token-ring-default active 1004 fddinet-default active 1005 trnet-default active		
puertos de acceso	S1#sh running-config Building configuration... Current configuration : 1189 bytes ! version 12.1 no service timestamps log datetime msec no service timestamps debug datetime msec no service password-encryption ! hostname S1 ! enable password cisco ! ! spanning-tree mode pvst ! interface FastEthernet0/1 switchport access vlan 30 switchport mode access ! interface FastEthernet0/2 switchport access vlan 30 *S3#sh running-config* *Building configuration...* *Current configuration : 1103 bytes* *!* *version 12.1* *no service timestamps log datetime msec* *no service timestamps debug datetime msec* *no service password-encryption* *!* *hostname S3* *!* *!* *spanning-tree mode pvst* *!* *interface FastEthernet0/1* *switchport access vlan 40* *switchport mode access* *!* *interface FastEthernet0/2* *switchport access vlan 40*		
Inter-VLAN Routing	MEDELLIN#sh ip interface brief Interface IP-Address OK? Method Status Protocol FastEthernet0/0 unassigned YES unset up up FastEthernet0/0.30 192.168.30.1 YES manual up up FastEthernet0/0.40 192.168.40.1 YES manual up up FastEthernet0/0.99 192.168.99.1 YES manual up up FastEthernet0/0.200 192.168.200.1 YES manual up up FastEthernet0/1 unassigned YES unset administratively down down Serial0/0/0 172.31.21.1 YES manual up up Serial0/1/0 unassigned YES unset administratively down down Vlan1 unassigned YES unset administratively down down		
Seguridad en los Switches	enable password cisco ! ! line vty 0 4 password cisco login	enable password cisco ! ! line vty 0 4 password cisco login	enable password cisco ! ! line vty 0 4 password cisco login

4. **En el Switch 3 deshabilitar DNS lookup**

En el Switch 3 deshabilitar DNS lookup			
	no ip domain-lookup		

5. **Asignar direcciones IP a los Switches acorde a los lineamientos.**

1. Asignar direcciones IP a los Switches acorde a los lineamientos.		
	Sw1 # interface Vlan99 ip address 192.168.99.2 255.255.255.0 ! ! Sw3# interface Vlan99 ip address 192.168.99.3 255.255.255.0 !	

6. **Desactivar todas las interfaces que no sean utilizadas en el esquema de red.**

Desactivar todas las interfaces que no sean utilizadas en el esquema de red.

```
S1(config)#interface range fastEthernet 0/4-23
S1(config-if-range)#no shutdown

S1(config-if-range)#do sh ip int bri
Interface          IP-Address     OK? Method Status          Protocol

FastEthernet0/1    unassigned     YES manual up              up

FastEthernet0/2    unassigned     YES manual up              up

FastEthernet0/3    unassigned     YES manual up              up

FastEthernet0/4    unassigned     YES manual down            down

FastEthernet0/5    unassigned     YES manual down            down

FastEthernet0/6    unassigned     YES manual down            down

FastEthernet0/7    unassigned     YES manual down            down

FastEthernet0/8    unassigned     YES manual down            down

FastEthernet0/9    unassigned     YES manual down            down

FastEthernet0/10   unassigned     YES manual down            down

FastEthernet0/11   unassigned     YES manual down            down

FastEthernet0/12   unassigned     YES manual down            down

FastEthernet0/13   unassigned     YES manual down            down

FastEthernet0/14   unassigned     YES manual down            down

FastEthernet0/15   unassigned     YES manual down            down

FastEthernet0/16   unassigned     YES manual down            down

FastEthernet0/17   unassigned     YES manual down            down

FastEthernet0/18   unassigned     YES manual down            down

FastEthernet0/19   unassigned     YES manual down            down

FastEthernet0/20   unassigned     YES manual down            down

FastEthernet0/21   unassigned     YES manual down            down

FastEthernet0/22   unassigned     YES manual down            down

FastEthernet0/23   unassigned     YES manual down            down

FastEthernet0/24   unassigned     YES manual up              up

Vlan1              unassigned     YES manual administratively down down

Vlan99             192.168.99.2   YES manual up              up
```

```
S3#sh ip int brie
Interface          IP-Address     OK? Method Status          Protocol
FastEthernet0/1    unassigned     YES manual up              up
FastEthernet0/2    unassigned     YES manual up              up
FastEthernet0/3    unassigned     YES manual up              up
FastEthernet0/4    unassigned     YES manual down            down
FastEthernet0/5    unassigned     YES manual down            down
FastEthernet0/6    unassigned     YES manual down            down
FastEthernet0/7    unassigned     YES manual down            down
FastEthernet0/8    unassigned     YES manual down            down
FastEthernet0/9    unassigned     YES manual down            down
FastEthernet0/10   unassigned     YES manual down            down
```

7. Implementar DHCP and NAT for IPv4

8. Configurar R1 como servidor DHCP para las VLANs 30 y 40.

Configurar R1 como servidor DHCP para las VLANs 30 y 40.	ip dhcp excluded-address 192.168.30.1 192.168.30.30 ip dhcp excluded-address 192.168.40.1 192.168.40.30

9. Reservar las primeras 30 direcciones IP de las VLAN 30 y 40 para configuraciones estáticas

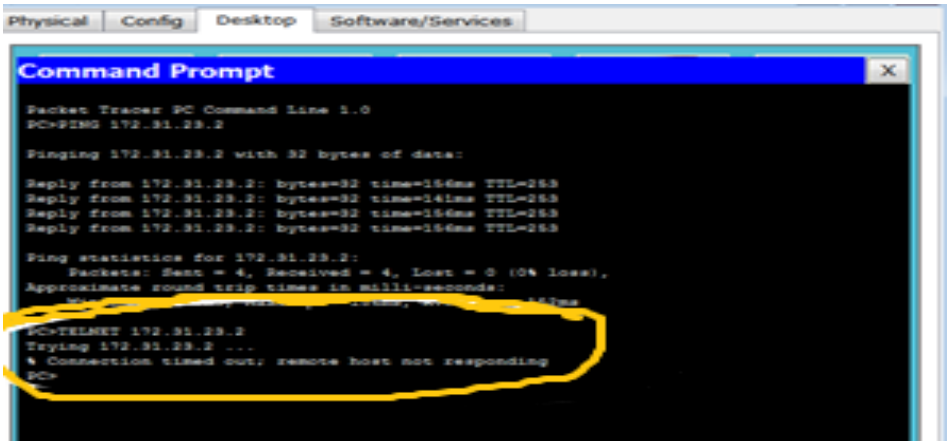
Configurar DHCP pool para VLAN 30	Name: ADMINISTRACION DNS-Server: 10.10.10.11 Domain-Name: ccna-unad.com Establecer default gateway.

Reservar las primeras 30 direcciones IP de las VLAN 30 y 40 para configuraciones estáticas.	! ip dhcp pool ADMINISTRACION network 192.168.30.0 255.255.255.0 default-router 192.168.30.1 dns-server 10.10.10.11 ip dhcp pool MERCADEO network 192.168.40.0 255.255.255.0 default-router 192.168.40.1 dns-server 10.10.10.11

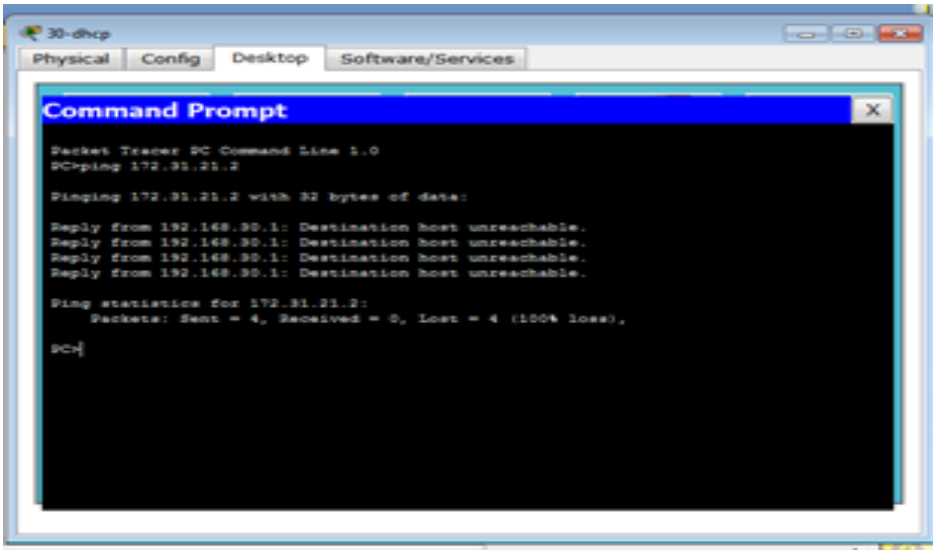
10. Configurar NAT en R2 para permitir que los host puedan salir a internet

Configurar NAT en R2 para permitir que los host puedan salir a internet	R2(config)# **interface s0/0/0** R2(config-if)# **ip nat outside** R2(config-if)# **interface s0/0/1** R2(config-if)# **ip nat inside**

11. Configurar al menos dos listas de acceso de tipo estándar a su criterio en para restringir o permitir tráfico desde R1 o R3 hacia R2.

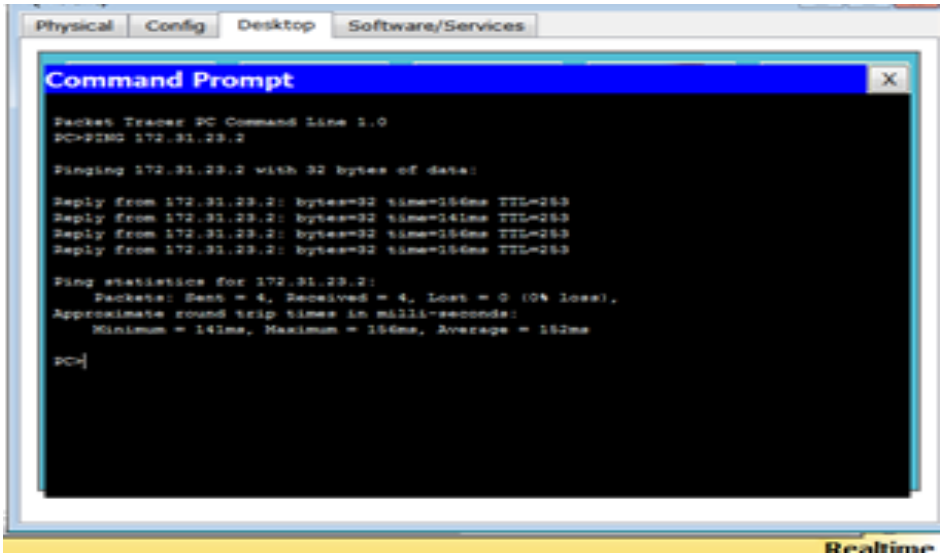


12. Configurar al menos dos listas de acceso de tipo extendido o nombradas a su criterio en para restringir o permitir tráfico desde R1 o R3 hacia R2.

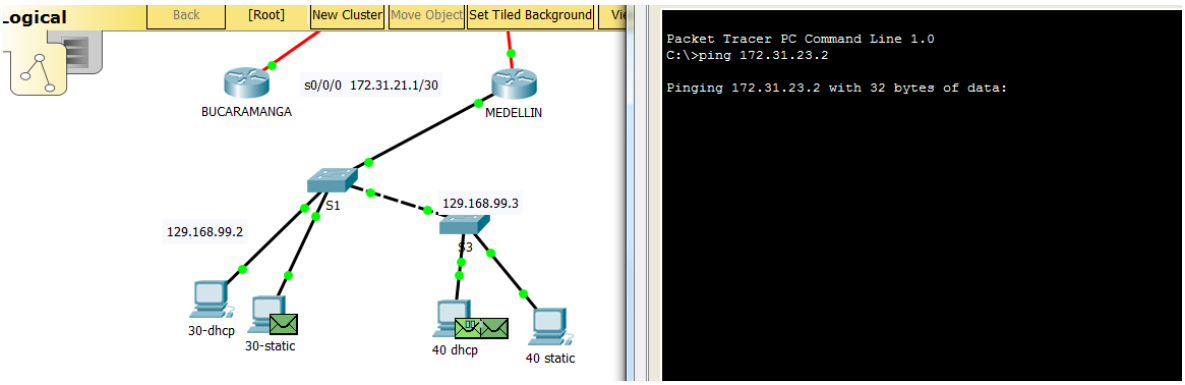


ping desde un equipo de la vlan 30 que no es el 192.168.30.37 y esta denegando los paquetes icmp debido a una lista de control de acceso chai bucaramanga

13. Verificar procesos de comunicación y redireccionamiento de tráfico en los routers mediante el uso de Ping y Traceroute.



Ping desde vlan 40 hacia router de Bucaramanga.



4. CONCLUSIONES

Con este trabajo se logra diseñar una red capaz de interconectar una empresa con sede en diferentes ciudades, donde se pudo asignar ip, configurar routers, switch para el funcionamiento de la red.

Para configurar esta red fue necesario conocer cada una de los comandos de configuración de los dispositivos, así como tener claro la función de redes VLAN. El router entre Vlan ayuda a las redes conmutadas de forma local a comunicarse entre sí.

Los routers no filtran tráfico de manera predeterminada. El tráfico que ingresa al router se enruta solamente en función de la información de la tabla de routing. El filtrado de paquetes controla el acceso a una red mediante el análisis de los paquetes entrantes y salientes y la transferencia o el descarte de estos según criterios como la dirección IP de origen, la dirección IP de destino y el protocolo incluido en el paquete. Un router que filtra paquetes utiliza reglas para determinar si permite o deniega el tráfico. Un router también puede realizar el filtrado de paquetes en la capa 4, la capa de transporte.

5. REFERENCIAS BIBLIOGRÁFICAS

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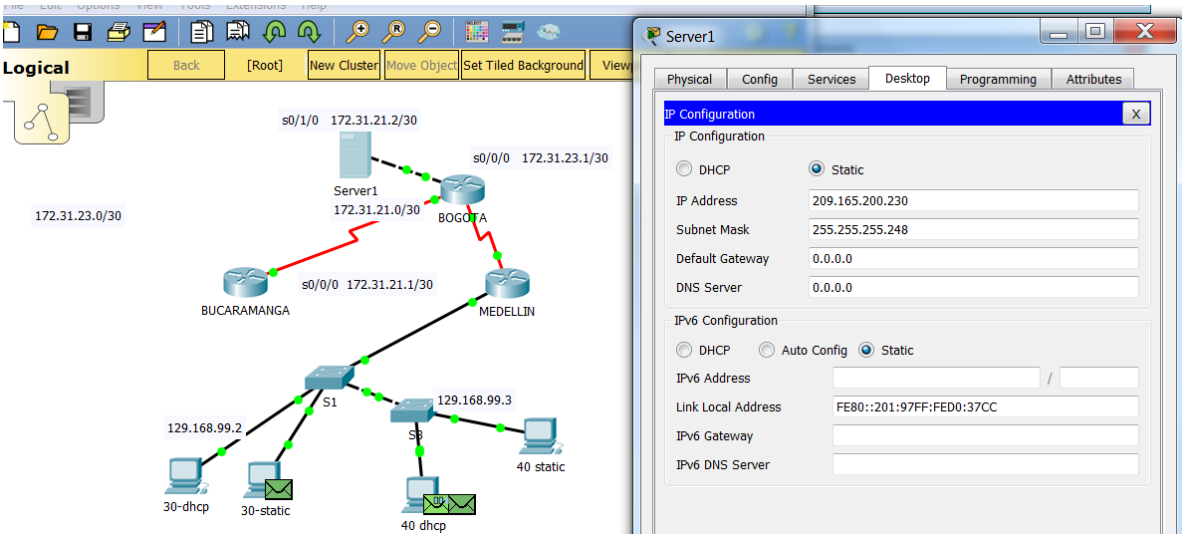
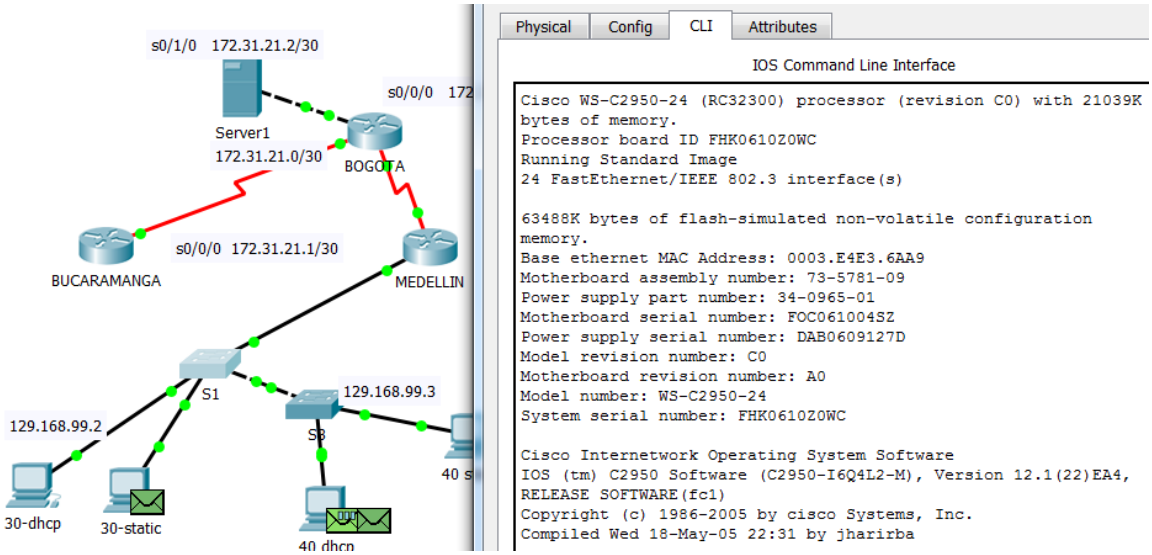
[2] CISCO. (2018). Routing y switching de CCNA: Principios básicos de routing y switching, tomado de: https://1314297.netacad.com/courses/654717.

[3] Red WAN. Tomado de: https://www.youtube.com/watch?v=jTaJVtEUvqY

ANEXOS


Logical
Back
[Root]
New Cluster
Move Object
Set Tiled Background
s0/1/0 172.31.21.2/30
s0/0/0 172.31.23.1/30
Server1
172.31.21.0/30
BOGOTA
172.31.23.0/30
s0/0/0 172.31.21.1/30
BUCARAMANGA
MEDELLIN
S1
129.168.99.3
129.168.99.2
S3
40 static
30-dhcp
30-static
40 dhcp
Server1
Physical
Config
Services
Desktop
Programming
Attributes
IP Configuration
DHCP
Static
IP Address
209.165.200.230
Subnet Mask
255.255.255.248
Default Gateway
0.0.0.0
DNS Server
0.0.0.0
IPv6 Configuration
DHCP
Auto Config
Static
IPv6 Address
Link Local Address
FE80::201:97FF:FED0:37CC
IPv6 Gateway
IPv6 DNS Server


s0/1/0 172.31.21.2/30
s0/0/0 172
Server1
172.31.21.0/30
BOGOTA
BUCARAMANGA
s0/0/0 172.31.21.1/30
MEDELLIN
S1
129.168.99.3
129.168.99.2
S3
40 s
30-dhcp
30-static
40 dhcp
Physical
Config
CLI
Attributes
IOS Command Line Interface
Cisco WS-C2950-24 (RC32300) processor (revision C0) with 21039K
bytes of memory.
Processor board ID FHK0610Z0WC
Running Standard Image
24 FastEthernet/IEEE 802.3 interface(s)
63488K bytes of flash-simulated non-volatile configuration
memory.
Base ethernet MAC Address: 0003.E4E3.6AA9
Motherboard assembly number: 73-5781-09
Power supply part number: 34-0965-01
Motherboard serial number: FOC061004SZ
Power supply serial number: DAB0609127D
Model revision number: C0
Motherboard revision number: A0
Model number: WS-C2950-24
System serial number: FHK0610Z0WC
Cisco Internetwork Operating System Software
IOS (tm) C2950 Software (C2950-I6Q4L2-M), Version 12.1(22)EA4,
RELEASE SOFTWARE(fc1)
Copyright (c) 1986-2005 by cisco Systems, Inc.
Compiled Wed 18-May-05 22:31 by jharirba

BOGOTA

Physical | Config | CLI

IOS Command Line Interface

```
BOGOTA#
BOGOTA#sh ip rou
BOGOTA#sh ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     10.0.0.0/32 is subnetted, 1 subnets
C       10.10.10.10 is directly connected, Loopback0
     172.31.0.0/30 is subnetted, 2 subnets
C       172.31.21.0 is directly connected, Serial0/1/0
C       172.31.23.0 is directly connected, Serial0/0/0
O    192.168.30.0/24 [110/65] via 172.31.21.1, 00:17:16, Serial0/1/0
O    192.168.40.0/24 [110/65] via 172.31.21.1, 00:17:16, Serial0/1/0
     209.165.200.0/29 is subnetted, 1 subnets
C       209.165.200.224 is directly connected, FastEthernet0/0
BOGOTA#
```

Copy | Paste

MEDELLIN

Physical | Config | CLI

IOS Command Line Interface

```
MEDELLIN#
MEDELLIN#SH IP ROU
MEDELLIN#SH IP ROUte
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     172.31.0.0/30 is subnetted, 2 subnets
C       172.31.21.0 is directly connected, Serial0/0/0
O       172.31.23.0 [110/15000] via 172.31.21.2, 00:16:20, Serial0/0/0
C    192.168.30.0/24 is directly connected, FastEthernet0/0.30
C    192.168.40.0/24 is directly connected, FastEthernet0/0.40
C    192.168.99.0/24 is directly connected, FastEthernet0/0.99
C    192.168.200.0/24 is directly connected, FastEthernet0/0.200
     209.165.200.0/29 is subnetted, 1 subnets
O       209.165.200.224 [110/7501] via 172.31.21.2, 00:16:20, Serial0/0/0
MEDELLIN#
```

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BOGOTA

Physical | Config | CLI

IOS Command Line Interface

```
BOGOTA#
BOGOTA#
BOGOTA#
BOGOTA#
BOGOTA#
BOGOTA#
BOGOTA#
BOGOTA#
BOGOTA#
BOGOTA#
BOGOTA#SH IP OS
BOGOTA#SH IP OSpf NE
BOGOTA#SH IP OSpf NEighbor

Neighbor ID     Pri   State           Dead Time   Address         Interface
3.3.3.3           0   FULL/  -        00:00:37    172.31.23.2     Serial0/0/0
1.1.1.1           0   FULL/  -        00:00:39    172.31.21.1     Serial0/1/0
BOGOTA#
BOGOTA#
BOGOTA#
BOGOTA#
BOGOTA#
BOGOTA#
BOGOTA#
```

Copy | Paste

BUCARAMANGA

Physical | Config | CLI

IOS Command Line Interface

```
BUCARAMANGA#
BUCARAMANGA#
BUCARAMANGA#SH IP INT BRI
BUCARAMANGA#SH IP INT BRIef
Interface              IP-Address      OK? Method Status                Protocol


FastEthernet0/0        unassigned      YES unset  administratively down down

FastEthernet0/1        unassigned      YES unset  administratively down down

Serial0/0/0            unassigned      YES unset  administratively down down

Serial0/1/0            172.31.23.2     YES manual up                    up

Loopback4              192.168.4.1     YES manual up                    up

Loopback5              192.168.5.1     YES manual up                    up

Loopback6              192.168.6.1     YES manual up                    up

Vlan1                  unassigned      YES unset  administratively down down
BUCARAMANGA#
```

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